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10/601,505	06/23/2003	Chih C. Lin	024-34393CIP	9707

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EXAMINER

COLLINS, GIOVANNA M

ART UNIT PAPER NUMBER

3672

DATE MAILED: 11/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/601,505

**Applicant(s)**

LIN ET AL.

**Examiner**

Giovanna M. Collins

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 20030623.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Specification*

1. The disclosure is objected to because of the following informalities: The phrase "DLC coatings 41" should be changed to - - DLC coatings 49 - -.

Appropriate correction is required.

### *Claim Objections*

Claims 1-24 are objected to because of the following informalities: The acronym "DLC" needs to be defined in the claims. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-4,9-11,14-15 and 21-22 are rejected under 35 U.S.C. 102(e) as being anticipated by Nishiyama et al. (6,637,528).

Nishiyama discloses an earth-boring bit, comprising a bit body (1); a cantilevered bearing pin (2) depending from the bit body, a cone (3) mounted for rotation on the bearing pin, and a bearing surface (at 7a,7b and 6a,6b) between the cone and the bearing pin the bearing surface having a DLC coating formed thereon (see col. 7, lines 58-62 and col. 9, lines 36-41).

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Referring to claim 2, Nishiyama discloses, the coating has a thickness in the range from 1-10 micrometers (see col. 9, lines 37-38).

Referring to claim 3, Nishiyama discloses, the coating has a thickness in the range from 2-5 micrometers (see col. 9, lines 37-38).

Referring to claim 4, Nishiyama discloses, the coating has a thickness in the range from 2-3 micrometers (see col. 9, lines 37-38).

Referring to claim 9, Nishiyama discloses a thrust waster (at 7a,7b) and the bearing surface containing the DLC coating being on at least one side of the thrust washer (see col. 7, lines 58-62 and col. 9, lines 36-41).

Referring to claim 10, Nishiyama discloses a sleeve (at 6a,6b) and the bearing surface containing the DLC coating being on at least one side of the thrust washer (see col. 7, lines 58-62 and col. 9, lines 36-41).

Referring to claim 11, Nishiyama discloses a thrust waster (at 7a,7b) and a sleeve (at 6a,6b) and the bearing surface containing the DLC coating being on at least one side of the thrust washer and the sleeve (see col. 7, lines 58-62 and col. 9, lines 36-41).

Referring to claim 14, Nishiyama discloses an earth-boring bit, comprising a bit body (1); a cantilevered bearing pin (2) depending from the bit body, the bearing pin having a thrust shoulder that is in a plane perpendicular to the axis of the bearing pin; a cone (3) mounted for rotation on the bearing pin, the cone having a thrust shoulder facing toward the thrust shoulder of the bearing pin; and a thrust washer (7a,7b) located between and in engagement with the thrust shoulders of the bearing pin and the cone, the thrust washer having a DLC coating formed thereon on at least one side (see col. 7, lines 58-62 and col. 9, lines 36-41).

Referring to claim 15, Nishiyama discloses a DLC coating (see col. 7, lines 58-62) is formed on both sides of the thrust washer.

Referring to claim 21, Nishiyama discloses an earth-boring bit, comprising a bit body (1); a cantilevered bearing pin (2) depending from the bit body, the bearing pin having a thrust shoulder that is in a plane perpendicular to the axis of the bearing pin; a cone (3) mounted for rotation on the bearing pin, the cone having a thrust shoulder facing toward the thrust shoulder of the bearing pin; and a sleeve (6a, 6b) located between the bearing pin and a cavity in the cone and having a DLC coating on at least one side (see col. 7, lines 58-62 and col. 9, lines 36-41).

Referring to claim 22, Nishiyama discloses a DLC coating (see col. 7, lines 58-62) is formed on both sides of the sleeve (6a,6b).

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Scott (6,062,070) in view of Liston (5,593,234).

Scott discloses (see Figs. 2-4) an earth-boring bit, comprising a bit body (12); a cantilevered bearing pin (30) depending from the bit body; a cone (3) mounted for rotation on the bearing pin, and a bearing surface (at 7a,7b and 6a,6b) between the cone (34). Scott discloses a

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coating (48,46) between the pin and cone but does not disclose the coating is a DLC coating.

Liston teaches it is known in the art to use diamond or diamond like coatings as hard surface coatings (see col. 3, line 66-col. 4, line 5). As one of ordinary skill in the art would be familiar with the use of DLC as a hard surface coating, it would be obvious to one of ordinary skill in the art to modify the bit disclosed by Scott to use a DLC coating as the hard surface coating as taught by Liston.

Referring to claim 12, Scott discloses a coating is formed on a journal surface of the bearing pin (see fig. 3).

Referring to claim 13, Scott discloses a coating is formed within a cavity of a cone (see fig. 4).

5. Claims 5-7 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiyama et al. ('528) in view of Handbook of Carbon, Graphite, Diamond and Fullerenes, by Pierson.

Nishiyama discloses the bit of claim 1 but does not specifically disclose the DLC coating has a Knoop Scale Hardness in the range from 2000-5000. Pierson teaches that one property of DLC coatings is that they have a Knoop Scale Hardness in the range of 2000-5000 (see table 14.2). As one of ordinary skill in the art would be familiar with the properties of DLC coating in order to properly apply it, it would be obvious to one of ordinary skill in the art to modify the bit disclosed by Nishiyama to have a Knoop Scale Hardness in the range of 2000-5000 as taught by Pierson.

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Referring to claims 6 and 18, Nishiyama discloses the bit of claim 1 but does not specifically disclose the DLC coating is of carbon with a mixture of  $sp^3$  and  $sp^2$  bonds between atoms of the carbon. Pierson teaches that one property of DLC coatings is that they are carbon with a mixture of  $sp^3$  and  $sp^2$  bonds between atoms of the carbon (see page 337, paragraph 2). As one of ordinary skill in the art would be familiar with the properties of DLC coating in order to properly apply it, it would be obvious to one of ordinary skill in the art to modify the bit disclosed by Nishiyama to have the DLC coating be carbon with a mixture of  $sp^3$  and  $sp^2$  bonds between atoms of the carbon as taught by Pierson.

Referring to claims 7 and 19, Nishiyama discloses the bit of claim 1 but does not specifically disclose the DLC coating is amorphous and hydrogenated amorphous carbon. Pierson teaches that one property of DLC coatings is that it is amorphous and hydrogenated amorphous carbon (see page 339-340, headings 2.4 and 2.5). As one of ordinary skill in the art would be familiar with the properties of DLC coating in order to properly apply it, it would be obvious to one of ordinary skill in the art to modify the bit disclosed by Nishiyama to have the DLC coating be amorphous and hydrogenated amorphous carbon as taught by Pierson.

6. Claims 8 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiyama et al. ('528) in view of Lemelson (5,794,801).

Referring to claims 8 and 20, Nishiyama discloses the bit of claim 1 but does not specifically disclose the DLC coating is doped with an alloying element from the grouping consisting essentially of silicon, boron and boron nitride and a refractory metallic element from the group consisting essentially of tantalum, titanium, tungsten, niobium and zirconium.

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Lemelson teaches that DLC coatings can be doped with boron, silicon, tungsten, and titanium.

As one of ordinary skill in the art would be familiar with the properties of DLC coating in order to properly apply it, it would be obvious to one of ordinary skill in the art to modify the bit disclosed by Nishiyama to have the DLC coating be doped with boron, silicon, tungsten, titanium as taught by Lemelson.

7. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiyama et al. (6,637,528) in view of Applicant's Admitted Prior Art.

Nishiyama discloses the bit of claim 14 but does not disclose the thrust shoulder contains an inlay of hard wear resistant material. The Applicant admits on page 2, lines 19-20, it is well known in the art to apply hard wear resistant material on the thrust shoulder. As one of ordinary skill in the art would be familiar with applying a hard wear resistant material on the thrust shoulder of a bearing pin, it would be obvious to one of ordinary skill in the art to modify the bit disclosed by Nishiyama to have an inlay of hard wear resistant material as taught by the Applicant's Admitted Prior Art.

8. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiyama et al. ('528) in view of Garner ('203) and Liston ('234).

Nishiyama et al. discloses the tool of claim 14 but does not specifically disclose the thrust shoulder contains a DLC coating. Garner teaches applying a coating to a thrust shoulder helps to improve wear resistance (see Fig. 4, and col. 2, lines 12-30). Liston teaches that it is well known in the art to use a DLC coating to on bearing surfaces to improve wear resistance (see col.



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3, line 66- col. 4, line 5). As it would be advantageous to improve the wear resistance of the thrust shoulder and DLC coatings are well known in the art, it would be obvious to modify the tool disclosed by Nishiyama to have a coating on the bearing pin and the cavity of the cone as taught by Garner and to use DLC as taught by Liston.

9. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiyama et al. ('528) in view of Scott ('070) and Liston ('234).

Referring to claims 23 and 24, Nishiyama et al. discloses the tool of claim 21 but does not specifically disclose the bearing pin and the cavity of the cone contains a DLC coating. Scott teaches putting a coating on a bearing pin and the cavity of a cone helps to improve wear resistance (see Figs. 3-4 and col. 2, lines 26-59). Liston teaches that it is well known in the art to use a DLC coating to on bearing surfaces to improve wear resistance (see col. 3, line 66- col. 4, line 5). As it would be advantageous to improve the wear resistance of the bearing pin and the cavity of the cone and DLC coatings are well known in the art, it would be obvious to modify the tool disclosed by Nishiyama to have a coating on the bearing pin and the cavity of the cone as taught by Scott and to use DLC as taught by Liston.

### ***Conclusion***


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Giovanna M. Collins whose telephone number is 703-306-5707. The examiner can normally be reached on 6:30-3 M-F.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David J. Bagnell can be reached on 703-308-2151. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Gmc

  
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